

Name: \_\_\_\_\_

## at1124exam: Radicals and Squares (v824)

### Question 1

Simplify the radical expressions.

$$\sqrt{63}$$

$$\sqrt{99}$$

$$\sqrt{44}$$

$$\frac{\sqrt{3 \cdot 3 \cdot 7}}{3\sqrt{7}}$$

$$\frac{\sqrt{3 \cdot 3 \cdot 11}}{3\sqrt{11}}$$

$$\frac{\sqrt{2 \cdot 2 \cdot 11}}{2\sqrt{11}}$$

### Question 2

Find all solutions to the equation below:

$$\frac{(x+6)^2 - 9}{8} = 9$$

First, multiply both sides by 8.

$$(x+6)^2 - 9 = 72$$

Then, add 9 to both sides.

$$(x+6)^2 = 81$$

Undo the squaring. Remember the plus-minus symbol.

$$x+6 = \pm 9$$

Subtract 6 from both sides.

$$x = -6 \pm 9$$

So the two solutions are  $x = 3$  and  $x = -15$ .

### Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 6x = 40$$

$$x^2 + 6x + 9 = 40 + 9$$

$$x^2 + 6x + 9 = 49$$

$$(x + 3)^2 = 49$$

$$x + 3 = \pm 7$$

$$x = -3 \pm 7$$

$$x = 4 \quad \text{or} \quad x = -10$$

### Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 4x^2 + 24x + 42$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 4 .

$$y = 4(x^2 + 6x) + 42$$

We want a perfect square. Halve 6 and square the result to get 9 . Add and subtract that value inside the parentheses.

$$y = 4(x^2 + 6x + 9 - 9) + 42$$

Factor the perfect-square trinomial.

$$y = 4((x + 3)^2 - 9) + 42$$

Distribute the 4.

$$y = 4(x + 3)^2 - 36 + 42$$

Combine the constants to get **vertex form**:

$$y = 4(x + 3)^2 + 6$$

The vertex is at point  $(-3, 6)$ .